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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,421	03/26/2004	Jin Ki Kim	PAT 980-2	7842
26123 7590 01/28/2008 BORDEN LADNER GERVAIS LLP Anne Kinsman WORLD EXCHANGE PLAZA 100 QUEEN STREET SUITE 1100 OTTAWA, ON K1P 1J9 CANADA			EXAMINER HUR, JUNG H	
			ART UNIT 2824	PAPER NUMBER
			NOTIFICATION DATE 01/28/2008	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/809,421

Applicant(s)

KIM, JIN KI

Examiner

Jung (John) H. Hur

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-47 is/are pending in the application.
- 4a) Of the above claim(s) 39-47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of invention Group I, claims 29-42, in the reply filed on 06 November 2007 is acknowledged. However, in the reply, the applicant failed to elect one of the two species specified in the previous Office Action, mailed 18 October 2007.

During a telephone conversation with Ms. Kinsman on 28 December 2007, a provisional election was made without traverse to prosecute the species Group A, claims 29-38. Affirmation of this election must be made by applicant in replying to this Office action.

Therefore, claims 39-47 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected invention and species, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 29-32 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art ("APA") in view of U.S. Pat. Appl. Pub. No. 2002/0015348 ("GILLINGHAM") and U.S. Pat. No. 6,697,276 ("PEREIRA").**

Regarding claim 29, APA discloses a content addressable memory device comprising: rows of matchlines (ML0-MLn, in Fig. 2), a first number of ternary cells (for example, those of

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Fig. 3 or 4, as applied to 30 in Fig. 2; see also paragraph [0006]) connected in parallel to each of the matchlines (see Fig. 2); or a second number of binary cells (for example, those of Fig. 5, as applied to 30 in Fig. 2; see also paragraph [0006]) connected in parallel to each of the matchlines (see Fig. 2), the binary cells being smaller in size than the ternary cells (compare Fig. 5 with Fig. 3 or 4); and matchline sense amplifiers (within 27, in Fig. 2) connected to each of the matchlines (see Fig. 2) for detecting one of the miss condition and a match condition in response to search data (on SL lines, in Fig. 2), each matchline sense amplifier providing a match output if data stored in the ternary cells and the binary cells of each row matches the search data (see for example paragraph [0005]).

APA does not disclose that the matchlines are precharged to a voltage level corresponding to a miss condition, and that the second number of binary cells are connected to each of the matchlines with the first number of ternary cells and are operable simultaneously with the ternary cells.

GILLINGHAM discloses matchlines (including MLi, in Fig. 5) that are precharged (via PRE and 170 in Fig. 5) to a voltage level (ground or VSS) corresponding to a miss condition (see for example paragraph [0043]).

PEREIRA discloses a first number of ternary cells (see for example column 34, lines 19-23) connected to matchlines (of each row; see column 34, lines 19-23) with a second number of binary cells (see for example column 34, lines 19-23) and are operable simultaneously (since they in the same row; see also Fig. 42 and column 33, lines 38-49, as applied to the embodiment of column 34, lines 19-23).

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It would have been obvious at the time the invention was made to a person having ordinary skill in the art to precharge the matchlines of APA to a voltage level corresponding to a miss condition (as in GILLINGHAM), for the purpose of saving power (see for example GILLINGHAM paragraph [0043]).

Further, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to connect a first number of ternary cells with a second number of binary cells to matchlines in APA and operate them simultaneously (as in PEREIRA), since PEREIRA indicates a desirability of such arrangement according to application needs, recognized by the person of ordinary skill in the art (implied in PEREIRA column 34, lines 19-23, in the context of the whole paragraph of lines 1-23).

Regarding claims 30 and 31, the above combination discloses the content addressable memory device of claim 29, wherein the ternary cells include SRAM based ternary content addressable memory cells (see for example Fig. 3 or 4 of APA, as applied to the above combination);

wherein the binary cells include SRAM based binary content addressable memory cells (see for example Fig. 5 of APA, as applied to the above combination).

Regarding claim 32, the above combination discloses the content addressable memory device of claim 29, but does not disclose that the ternary cells include DRAM based ternary content addressable memory cells. However, GILLINGHAM discloses a DRAM based ternary content addressable memory cell (see for example Fig. 2 and the first half of paragraph [0005]).

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It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use DRAM based ternary content addressable memory cells for the ternary cells of the above combination, as an alternative to the SRAM based ternary content addressable memory cell, for the purpose of increasing the packing density (see for example GILLINGHAM the first half of paragraphs [0005] and [0061]).

Regarding claim 38, the above combination discloses the content addressable memory device of claim 29, but does not disclose that the first number is selected to store at least a corresponding number of header bits. However, APA discloses use of ternary cells for header bits (see for example APA paragraph [0013], as applied to the above combination).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to select the first number to store at least a corresponding number of header bits in the above combination, for the purpose of effectively and efficiently accommodating variable bit length headers (see for example APA, near the end of paragraph [0012] and paragraph [0013]).

4. Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art ("APA") in view of U.S. Pat. Appl. Pub. No. 2002/0015348 ("GILLINGHAM") and U.S. Pat. No. 6,697,276 ("PEREIRA") as applied to claim 29 above, and further in view of U.S. Pat. No. 6,108,227 ("VOELKEL").

Regarding claims 33 and 34, the above APA/GILLINGHAM/PEREIRA combination discloses the content addressable memory device of claim 29, but does not disclose that the

second number of binary cells are interleaved with the first number of ternary cells, or a third number of configurable ternary-binary content addressable memory cells connected in parallel to each of the matchlines.

VOELKEL discloses a configurable ternary-binary content addressable memory (CAM) cell (see for example Fig. 2), and an arrangement in which one or more columns of CAM cells can be switched between modes and such a switching capability can be performed on a column-by-column basis (see for example column 7, lines 5-15).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to interleave the second number of binary cells with the first number of ternary cells in the above APA/GILLINGHAM/PEREIRA combination (for example, on a column-by-column basis, similar to the arrangement of VOELKEL), since, as an optimum arrangement, VOELKEL indicates a desirability of such arrangement, recognized by the person of ordinary skill in the art (implied in VOELKEL column 7, lines 5-15).

Further, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to connect a third number of configurable ternary-binary content addressable memory cells in parallel to each of the matchlines of the above APA/GILLINGHAM/PEREIRA combination (as in VOELKEL), since, as an optimum arrangement, VOELKEL indicates a desirability of such arrangement, recognized by the person of ordinary skill in the art (implied in VOELKEL column 7, lines 5-15). In addition, use of the configurable cells provides a configuration flexibility (see for example VOELKEL column 4, lines 21-33).

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5. Claims 35-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art ("APA") in view of U.S. Pat. Appl. Pub. No. 2002/0015348 ("GILLINGHAM") and U.S. Pat. No. 6,697,276 ("PEREIRA '276") as applied to claim 29 above, and further in view of U.S. Pat. No. 6,191,970 ("PEREIRA '970").

Regarding claims 35-36, the above APA/GILLINGHAM/PEREIRA '276 combination discloses the content addressable memory device of claim 29, but does not disclose that each of the rows of matchlines includes a segmented matchline, that the segmented matchline includes a first matchline segment and a second matchline segment, and that the first number of ternary cells are coupled to the first matchline segment and the second number of binary cells are coupled to the second matchline segment.

PEREIRA '970, for example in Fig. 4, discloses a row of matchline (including ML_row) including a first matchline segment (ML_a) and a second matchline segment (ML_b) for a row of CAM cells (CAM CELLS in Fig. 4).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to include a first matchline segment and a second matchline segment for the row of matchlines of the above APA/GILLINGHAM/PEREIRA '276 combination, and, as an optimum arrangement in light of PEREIRA '276, couple the first number of ternary cells to a first matchline segment and the second number of binary cells to a second matchline segment, for the purpose of reducing power consumption (see for example PEREIRA '970, column 1, line 65 through column 2, line 2).

Response to Arguments

6. Applicant's arguments with respect to claim 29, filed 29 May 2007, regarding the matchline precharging (see the bottom half of page 7) have been considered but are moot in view of the new ground(s) of rejection. See the rejections above.

In response to the possibility of a "logical row" in Pereira (see the bottom half of page 7), it is noted that whether the "matchline" in claim 29 is a physical or logical matchline is not specifically recited in the claim. Further, the presence of dependent claims 35-37, which recite a "segmented matchline," implies that the matchline in claim 29 includes a logical matchline.

7. Applicant's arguments with respect to claims 39 and 43 have been considered but are moot in view of the above elections. See the Election/Restrictions section above.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jung (John) H. Hur whose telephone number is (571) 272-1870. The examiner can normally be reached on M-F 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms can be reached on (571) 272-1869. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jhh

/J. H. Hur/
Primary Patent Examiner
Art Unit 2824
21 January 2008